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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/562,467

12/27/2005

Yukio Miyairi

126464

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OLIFF & BERRIDGE, PLC  
P.O. BOX 320850  
ALEXANDRIA, VA 22320-4850

EXAMINER

RIPA, BRYAN D

ART UNIT

PAPER NUMBER

1795

MAIL DATE

DELIVERY MODE

06/05/2009

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/562,467	<b>Applicant(s)</b> MIYAIRI ET AL.	
	<b>Examiner</b> BRYAN D. RIPA	<b>Art Unit</b> 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 11-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 11-21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 December 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. ____.                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>12/27/05; 2/22/06; 3/17/08</u>                                | 6) <input type="checkbox"/> Other: ____.                          |

## **DETAILED ACTION**

### ***Priority***

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

### ***Claim Objections***

1. Claims 11, 12 and 20 are objected to because of the following informalities:

Regarding claims 11 and 20 each omit the word “the” or “said” before referring to the aforementioned holding members, see line 9 of claim 11 and line 8 of claim 20.

Regarding claim 12, the word the or said is omitted prior to referring to the aforementioned fixed end portions, see line 3 of claim 12.

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 11-21 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01. The omitted structural cooperative relationship is the relationship

Art Unit: 1795

between the electrode and its respective ends, referred to as a fixed end portion and a free end portion in claims 11 and 12.

The examiner suggests the applicant delineate in claims 11 and 20, the two independent claims, that the electrode has both a fixed end and a free end portion in order to denote the structural relationship.

In claims drawn to an apparatus statutory class of invention, the structure which goes to make up the device must be clearly and positively specified. The structure must be organized and correlated in such a manner as to present a complete operative device (see MPEP § 2172.01). Furthermore, a feature that is taught as critical in the specification should be recited in the claims (see MPEP § 2164.08c).

3. Claims 11-21 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Independent claims 11 and 20 recite the limitation "the opposite side end portions (fixed end portions)" in lines 7 and 6 respectively. However, there is insufficient antecedent basis for this limitation in the claim.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

Art Unit: 1795

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

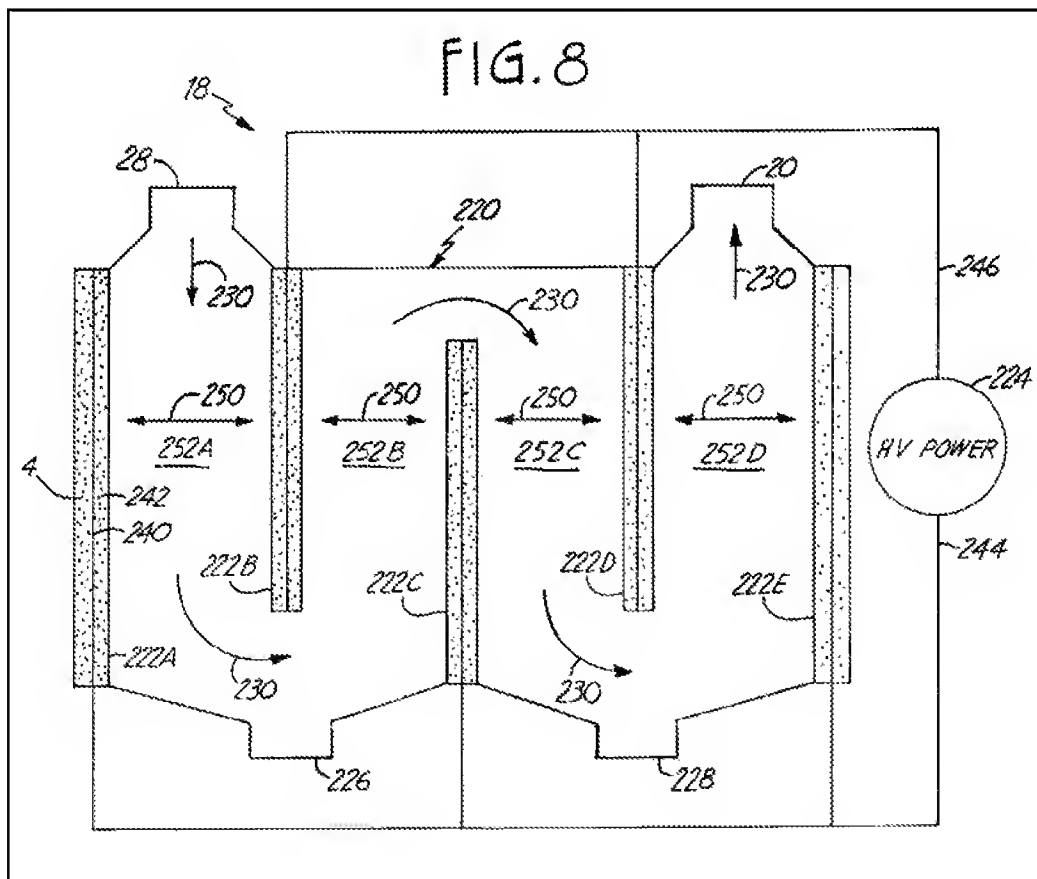
4. Claims 11, 15, 17 and 20 are rejected under 35 U.S.C. 102(b) as being anticipated by Ruan et al., (U.S. Pat. No. 6,146,599) (hereinafter referred to as "RUAN") with evidence from Nelson et al., (U.S. Pub. No. 2002/0131916) (hereinafter referred to as "NELSON I").

Regarding claim 11, RUAN teaches a plasma generating electrode comprising two or more electrodes disposed to face each other (see electrode panels 222A–E and col. 6 lines 49-51 teaching the electrodes facing each other to generate plasma in a non-thermal plasma reactor), and holding members for holding the electrodes at a predetermined interval and capable of generating a plasma by applying a voltage between the electrodes (see housing 220 and col. 6 lines 49-57 which teaches housing 220 holding electrode panels 222A–E at a set interval from each other for generating plasma by an application of a voltage from high voltage power source 224), wherein at least one of the electrodes facing each other has a plate-shaped ceramic body serving as a dielectric body and a conductive film disposed inside the ceramic body (see dielectric material 242 and 244, conductor 240, and col. 6 lines 57-63), and the holding members fix the opposite side end portions (fixed end portions) of the electrodes facing each other in the state of a cantilever in such a condition that the electrodes are held by the holding members in the state of cantilevers of the different directions alternately at a predetermined interval as a whole (see electrode panels 222A–E and col. 6 lines 63-67

Art Unit: 1795

showing alternating electrode panels being held in a cantilever state with alternating polarity). See figure 8 below.

Please note, in interpreting the phrase "cantilever state" the examiner is requiring the electrode to be fixed or attached only at a single end, i.e. thereby requiring the other end to be unattached or unsecured by the other side of the reactor housing either physically or by any other attachment means such as an adhesive.



Regarding claim 15, RUAN teaches the plasma generating electrode further comprising a connection terminal for electrical connection to the fixed end portions of

Art Unit: 1795

the electrodes (see terminals 244 and 246 and col. 6 lines 63-66 discussing the power source being electrically coupled to the electrodes at the fixed end portions). See figure 8 above.

Regarding claim 17, RUAN teaches the plasma generating electrode where the connection terminal is connected to the fixed end portions of the electrodes (see discussion above with respect to claim 15).

The claim limitation reciting “the connection terminal is connected to the fixed end portions of the electrodes by welding, brazing, or diffusion bonding” is considered a product-by-process claim limitation. The cited prior art teaches all of the positively recited structure of the claimed apparatus or product. The determination of patentability is based upon the apparatus structure itself. The patentability of a product or apparatus does not depend on its method of production or formation. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process. See *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985) (see MPEP § 2113).

Additionally, as evidenced by NELSON I, it is well known in the art to make such an electrical connection by welding or brazing (see ¶95).

Regarding claim 20, RUAN teaches a plasma reactor comprising a plasma generating electrode comprising two or more electrodes disposed to face each other (see NTP reactor 18 and col. 6 lines 47-67), and holding members for holding the

Art Unit: 1795

electrodes at a predetermined interval and capable of generating plasma by applying a voltage between the electrodes (see housing 220 and col. 6 lines 49-57 which teaches housing 220 holding electrode panels 222A–E at a set interval from each other for generating plasma by an application of a voltage from high voltage power source 224); wherein at least one of the electrodes facing each other has a plate-shaped ceramic body serving as a dielectric body and a conductive film disposed inside the ceramic body (see dielectric material 242 and 244, conductor 240, and col. 6 lines 57-63), and the holding members fix the opposite side end portions (fixed end portions) of the electrodes facing each other in the state of a cantilever in such a condition that the electrodes are held by the holding members in the state of cantilevers of the different directions alternately at a predetermined interval as a whole (see electrode panels 222A–E and col. 6 lines 63-67 showing alternating electrode panels being held in a cantilever state with alternating polarity), and a case body having a passage of gas containing a predetermined component and being capable of making the predetermined component contained in the gas react with plasma generated by the plasma generating electrode when the gas is introduced into the case body (see housing 220 and col. 3 lines 12-15 and col. 6 lines 42-46 teaching the housing being adapted so as to pass a flue gas through the reactor to remove various hazardous oxides in the gas). See figure 8 above.



Art Unit: 1795

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
  2. Ascertaining the differences between the prior art and the claims at issue.
  3. Resolving the level of ordinary skill in the pertinent art.
  4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
5. Claims 16 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over RUAN as applied to claims 11 and 15 above, and further in view of NELSON I.

Regarding claim 16, RUAN is silent as to the plasma generating electrode having as a main component of the connection terminal a metal with a thermal expansion coefficient of  $7 \times 10^{-6}$  (1/K) at 0 to 600°C or less.

However, NELSON teaches the main component of the connection terminal material being a metal with a similar thermal expansion coefficient to that of the dielectric layers, i.e. equal to or less than  $7 \times 10^{-6}$  (1/K) at 0 to 600°C (see ¶65 teaching

Art Unit: 1795

the use of low-expansion iron-nickel alloys among other materials for use in the connection terminal).

Moreover, NELSON I teaches the motivation for using such materials in fabricating the connection terminal in order allow for robust high temperature operation (see ¶65).

Consequently, it would have been obvious to one of ordinary skill in the art at the time of invention to use a low-expansion iron-nickel alloy having a thermal expansion coefficient of  $7 \times 10^{-6}$  (1/K) or less at 0 to 600°C as taught by NELSON in order to facilitate the more robust operation of the plasma reactor at high temperatures.

Regarding claim 18, NELSON I teaches the plasma generating electrode wherein the connection terminal is connected to the fixed end portions of the electrodes by welding or brazing (see ¶95).

6. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over RUAN as applied to claims 11 and 15 above, and further in view of Nelson et al., (U.S. Pub. No. 2002/0076363) (hereinafter referred to as "NELSON II").

Regarding claim 19, RUAN is silent as to how the connection terminal is formed.

However, NELSON II teaches the formation of the connection terminal by plating a conductive layer on the fixed end portions of the electrodes amongst other known

Art Unit: 1795

methods (see ¶45 teaching the formation of bus connection paths formed by a plating method).

Consequently, as shown by NELSON II, a person of ordinary skill in the art would accordingly have recognized the use of a plating method to facilitate the formation of the connection terminal.

The combination of familiar elements is likely to be obvious when it does no more than yield predictable results. See *KSR Int'l Co. v. Teleflex Inc.*, 82 USPQ2d 1385, 1395–97 (2007) (see MPEP § 2143, A.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to use a plating method, as taught by NELSON II, to form the conductive layer comprising the connection terminal in the disclosed plasma reactor of RUAN in order to obtain the predictable result of having a connection terminal as claimed.

7. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over RUAN as applied to claim 20 above, and further in view of Shinichi et al., (J.P. Pub. No. 2002-256853) (hereinafter referred to as "SHINICHI"); Miyao (J.P. Pub. No. 2002-256851) (hereinafter referred to as "MIYAO"); and Fujii et al., (U.S. Pat. No. 6,596,243) (hereinafter referred to as "FUJII").

Regarding claim 21, RUAN is silent as to the plasma reactor further comprising a honeycomb structure having a plurality of cells separated by partition walls and

Art Unit: 1795

disposed on an upstream side of the plasma generating electrode in the passage of the case body.

However, SHINICHI teaches the use of an oxidation catalyst on the upstream side of the plasma reactor in order to help control the emissions of NOX (see ¶17 and drawing 1). Additionally, FUJII teaches the application of the catalyst layer on a honeycomb-shaped carrier which would have a plurality of cells separated by partition walls (see col. 2 lines 48-49 and col. 3 lines 9-20). Moreover, MIYAO teaches an emission control device having a plasma reactor and a catalyst layer in a single case body (see ¶24 and drawing 6).

Consequently, as shown by SHINICHI, FUJII, and MIYAO, a person of ordinary skill in the art would accordingly have recognized the use of a honeycomb structure disposed on an upstream side of the plasma generating electrode in the passage of the case body.

The combination of familiar elements is likely to be obvious when it does no more than yield predictable results. See *KSR Int'l Co. v. Teleflex Inc.*, 82 USPQ2d 1385, 1395–97 (2007) (see MPEP § 2143, A.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to combine the honeycomb structure of FUJII for use as an upstream catalyst support as taught in SHINICHI in a single case body as shown in MIYAO to obtain the predictable result of providing a catalyst support structure as claimed.

***Allowable Subject Matter***

6. Claims 12-14 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

The aforementioned U.S. Pat. No. 6,146,599 to RUAN and U.S. Pub. No. 2002/0076363 to NELSON II; and U.S. Patents No. 6,576,202 to Chiu (hereinafter referred to as "CHIU"); and 4,472,174 to Chuan (hereinafter referred to as "CHUAN") represent the most relevant art.

Regarding claim 12, the cited prior art fails to teach a plasma generating electrode wherein the holding members have a large number of first groove portions for inserting the free end portions of the electrodes therein with a predetermined gap on each surface opposite the free end portions.

Moreover, while NELSON II does teach the holding members being adapted so as to have grooves for inserting the free end portions of the electrodes therein (see figures 1), NELSON II does not teach the free end portions of the electrodes being in a cantilever state or having a predetermined gap between the holding member and each side of the electrode (see ¶75 teaching the use of a suitable adhesive to bond the ends of the plate fins, i.e. electrodes, into the retention pockets, i.e. grooves).

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to BRYAN D. RIPA whose telephone number is 571-270-7875. The examiner can normally be reached on Monday to Friday, 9:00 AM to 5:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on 571-272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/B. D. R./  
Examiner, Art Unit 1795

/Brian J. Sines/  
Supervisory Patent Examiner, Art Unit 1795